Remarks

Claims 9-14 are pending in this application.

The examiner is requested to favorably reconsider the objections to claims 10 and 11 in view of the foregoing amendment. The typographical errors have been corrected.

The examiner is requested to favorably reconsider the rejections of claims 9 and 11 under 35 U.S.C. 112, first paragraph as lacking enablement in view of the foregoing amendment which renders moot the issues supporting these rejections.

Claims 9 and 10 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite in the recitation of " rings are substituted in such a way that they form an indenyl ring". This rejection is traversed because the phrase found to be objectionable by the examiner is a proviso statement which ensures that certain structural limitations are included. This does not amount to the recitation of a broad range and also a narrower range within the broad range. Favorable reconsideration is solicited.

Claim 15 has been canceled.

Claims 9 and 10 stand rejected under 35 U.S.C. 102(b) as being anticipated by Schmidt et al.; claims 9-12 stand rejected under 35 U.S.C. 102(b) as being anticipated by WO 98/56831 to Munck et al. and claims 9 and 10 stand rejected under 35 U.S.C. 102(b) as being anticipated by Dormand et al. These rejections are traversed. It should be noted, firstly, that the present invention is directed to specific bridged-indenyl metallocene monohalides, having at least one -O-R^3 or -S-R^3 sigma ligand bonded to

the metal; as reported in the proviso statement in the claims, at least one of the two cyclopentadienyl rings must form an indenyl ring. These metallocenes have the advantage of being readily soluble and, at the same time, show catayst activities in polymerization at least as good as the ones displayed by the corresponding metallocene dichlorides, known in the art (page 1, lines 36-41). More specifically, the metallocenes of the invention have a significantly better solubility in inert organic solvents; as explained in the first full paragraph on page 7 of the instant application, the concentration of the claimed metallocenes in organic solvents is at least doubled, and even 8 times higher than one of the corresponding dichloride compounds (see also the comparative solubility trials in Examples 1-4 and 6). This property is very important in the purification of racemic metallocenes by crystallization techniques, at the industrial level. Moreover, the metallocenes of the instant invention display a better crystallization behavior from inert organic solvents, which notably improve their purification process (page 7, lines 7-16 of the application). The bridged-indenyl compounds of formula (I) as presently claimed, wherein Y is O or S, are novel over the prior art of record.

Schmidt et al. is not relevant to the novelty of the instantly claimed compounds, since the bridged-indenyl metallocene monohalides of the invention are not disclosed. The same can be said for WO 98/56831 to Munck et al., which describes monohalide, monoamide metallocenes, falling outside of the scope of the claims as amended. Dormand et al. is not relevant to the novelty of the presently claimed compounds of formula (I), since it does not discloses only bis-cyclopentadienyl derivatives, while the compounds of the invention are bridged-indenyl metallocene monohalides (at least one

of the two cyclopentadienyl rings must form an indenyl ring). The solubility in inert organic solvents of the metallocenes claimed herein is significantly higher than the corresponding metallocene dichlorides known in the prior art. This would not be apparent from the cited prior art.

Claims 9-15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over EP 629,632 to Fukuoka et al. or Tsutsui et al. considered singularly or either in view of Dormond et al. or Repo et al. These rejections are traversed.

EP-A-629 632 to Fukuoka et al. discloses a broad class of bridged bis-indenyl metallocenes, wherein the transition metal M may be substituted in various ways: X^1 and X^2 may be hydrogen, halogen, a C_1-C_{20} hydrocarbon group, a C_1-C_{20} halogenated hydrocarbon group, an oxygen-containing group or a sulfur-containing group (page 6, lines 43-45). Preferably, X^1 and X^2 are a hydrogen atom or a halogen, a C_1-C_{20} hydrocarbon group (page 9, line 51), which fall outside of the definition of -Y-R^3 reported in the instant claims, where Y is O or S. As correctly noted by the examiner, no single embodiment encompassing all the claimed structural features is disclosed. The metallocenes of Fukuoka et al. have a high polymerization activity and give olefin polymers with high stereo and regioregularity. This document does not address the technical problem of the solubility in inert organic solvents. Therefore, there is no hint to modify the compounds of Fukuoka et al. by selecting the specific bridged-indenyl metallocene monohalides of the applicants' invention, in order to obtain a significantly better solubility in inert organic solvents and a better crystallization behavior from inert organic solvents.

preferably vs. claimed

BS

Tsutsui et al. disclose a broad class of bridged bis-cyclopentadienyl metallocenes, wherein the metal M has two sigma ligands X^1 and X^2 which may be a hydrocarbon group, a halogenated hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a silicon-containing group, a hydrogen atom or a halogen atom (col. 4, lines 24-29). As correctly noted by the examiner, no single embodiment encompassing all the claimed structural features is disclosed. The class of metallocenes of Tsutui et al. have a high activity in propylene polymerization and avoid the formation of a low-molecular weight component, so to obtain an olefin (co)polymer having excellent particle properties (col. 2, lines 26-39). But there is no suggestion to a person of ordinary skill to modify the compounds of Tsutsui et al. by selecting the specific bridged-indenyl metallocene monohalides claimed herein in order to obtain metallocenes having a significantly better solubility in inert organic solvents. The deficiencies of the primary references are not provided for by the ancillary references; Dormond et al. and Repo et al. because neither discloses the bridged-indenyl metallocene monohalides claimed herein.

Claims 9-15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. considered alone or in view of Repo et al. These rejections are traversed. Winter et al. disclose a broad class of bridged bis-indenyl metallocenes bearing substituents in positions 2 and/or 4 of the indenyl moieties, wherein the transition metal M2 may be variously substituted. All of the exemplified metallocenes are Zr dichloride derivatives). As correctly noted by the examiner, no single embodiment encompassing all elements of the instantly claimed metallocenes are disclosed. Nor is there any

suggestion that the instantly claimed compounds have a significantly higher solubility in inert organic solvents than the compounds disclosed in the prior art. Winters et al. aims to find highly stereo regular metallocenes with high polymerization activity. Wochner et al. is concerned with the hydrogen transfer reaction that occurs in the hydrogenolysis of alkyl zirconocenes, only bis-cyclopentadienyl compounds (not bridged-indenyl monohalide metallocenes) are disclosed. Moreover, the solubility in inert organic solvents is not addressed. Therefore, the invention claimed herein is neither anticipated nor rendered obvious by Winter et al. considered alone or in view of Repo et al.

Claims 11-15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuoka et al. in view of Wochner et al. and as being unpatentable over Fukuoka et al. in view of Barriola et al. These rejections are traversed. Both Fukuoka et al. and Wochner et al. have been discussed hereinbefore and neither relate the presently claimed bridged-indenyl monohalide metallocenes. Fukuoka et al. and Barriola et al. together are not suggestive of the presently claimed bridged-indenyl monohalide metallocenes having outstanding solubility properties. Favorable reconsideration is solicited.

Applicants hereby notify the examiner of a recently disclosed reference (EP 1 028 123). A Supplemental Information Disclosure Statement, PTO Form 1449 and a copy of the reference are hereby attached.

In view of the foregoing remarks, the applicants respectfully urge that the invention claimed herein is patentable and a notice of allowance is solicited.

To the extent necessary, applicant(s) petition for an Extension of Time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,

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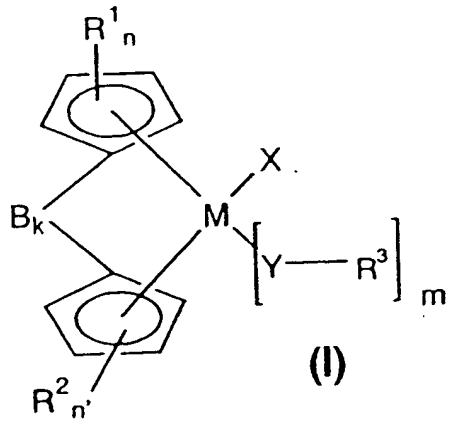
VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend claim 9-11 as follows:

Please cancel claim 15.

9.(amended) A compound of the formula (I),



(I)

where

M is a metal of transition group III, IV, V or VI of the Periodic Table of the Elements,

R^1 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are identical or different and are each a hydrogen atom or a C_1-C_{40}-group or R^1 is a C_1-C_{30}-group, or two or more radicals R^1 may be connected to one another in such a way that the radicals R^1 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

R^2 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are

identical or different and are each a hydrogen atom or a C_1-C_{40}-group, or R^2 is a C_1-C_{30}-group, or two or more radicals R^2 may be connected to one another in such a way that the radicals R^2 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

R^3 are identical or different and are each a C_2-C_{25}-alkenyl,C_3-C_{15}-alkylalkenyl, C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_1-C_{25}-alkyl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl or fluorinated C_7-C_{30}-alkylaryl,

X is a halogen atom,

Y is [an element of main group VI of the Periodic Table of the Elements or a fragment CH_2, CR^3_2, NR^3, PR^3 or P (=O)R^3] <u>oxygen or sulfur</u>,

n is from 0 to 4,

n' is from 0 to 4,

m is from 1 to 3,

k is 1,

B is a bridging structural element between the two cyclopentadienyl rings and

one or both cyclopentadienyl rings are substituted in such a way that they form an indenyl ring.

10.(amended) A compound as claimed in claim 9, wherein

M is Ti, Zr or Hf,

R^1 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are identical or different and are each a hydrogen atom a C_1-C_{20}-alkyl, C_1-C_{10}-fluoroallkyl, C_1-C_{10}-alkoxy, C_6-C_{10}-aryl, C_6-C_{10}-fluoroaryl, C_6-C_{10}-aryloxy, C_2-C_{10}-alkenyl,

or R^1 is C_1-C_{25}-alkyl, C_2-C_{25}-alkenyl, C_3-C_{15}-alkylalkenyl, C_6-C_{24}-aryl, C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_1-C_{25}-alkyl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl, fluorinated C_7-C_{30}-alkylaryl, or C_1-C_{12}-alkoxy, or two or more radicals R^1 may be connected to one another in such a way that the radicals [RI] R1 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

R^2 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are identical or different and are each a hydrogen atom a C_1-C_{20}-alkyl, C_1-C_{10}-fluoroallkyl, C_1-C_{10}-alkoxy, C_6-C_{10}-aryl, C_6-C_{10}-fluoroaryl, C_6-C_{10}-aryoxy,C_2-C_{10}-alkenyl,

or R^2 is C_1-C_{25}-alkyl, C_2-C_{25}-alkenyl, C_3-C_{15}-alkylalkenyl, C_6-C_{24}-aryl, C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_1-C_{25}-alkyl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl, fluorinated C_7-C_{30}-alkylaryl, or C_1-C_{12}-alkoxy, or two or more radicals R^2 may be connected to one another in such a way that the radicals R^2 and the atoms of the

cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

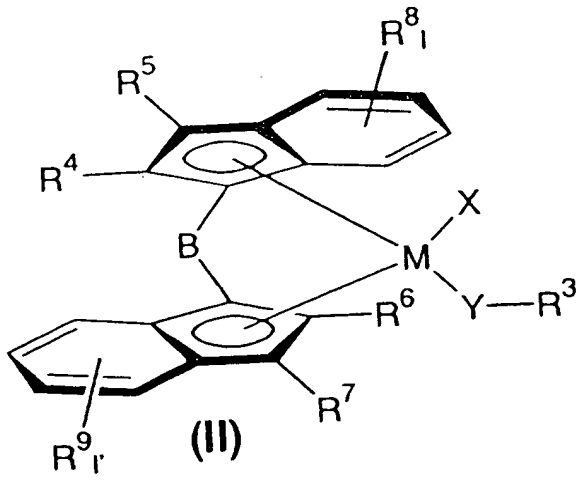
X is chlorine

Y is oxygen[,] or sulfur [or N R^3],

m is 1 and

one or both cyclopentadienyl rings are substituted in such a way that they form an indenyl ring which is substituted.

11.(amended) A compound of the formula (II)



(II)

where

M is Ti, Zr or Hf,

R^3 is isopropyl, tert-butyl, cyclohexyl or octyl, a C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl, or fluorinated C_7-C_{30}-alkylaryl

R^4, R^6 are identical or different and are each a hydrogen atom or a C_1-C_{20}-group,

R^5, R^7 are identical or different and are each a hydrogen atom or a C_1-C_{20}-group,

R^8, R^9 are identical or different and are each a hydrogen atom, a halogen atom

or a C_1-C_{20}-group, and two radicals R^8 or R^9 may form a monocyclic or polycyclic ring system which may in turn be substituted,

X is a halogen atom,

Y is [an element of main group VI of the Periodic Table of the Elements or a fragment CH, C $R^3{}_2$, NR^3, PR^3 or $P(=O)R^3$] oxygen or sulfur,

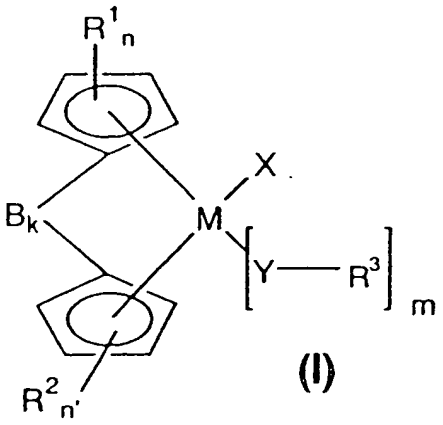
l, l' are identical or different and are each an integer from zero to 4,

B is a bridging structural element between the two indenyl radicals.

15.(canceled) ~~The use of a catalyst as claimed in claim 13 for olefin polymerization.~~

COPY OF ALL CLAIMS

9. A compound of the formula (I),



(I)

where

M is a metal of transition group III, IV, V or VI of the Periodic Table of the Elements,

R^1 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are identical or different and are each a hydrogen atom or a C_1-C_{40}-group or R^1 is a C_1-C_{30}-group, or two or more radicals R^1 may be connected to one another in such a way that the radicals R^1 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

R^2 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are identical or different and are each a hydrogen atom or a C_1-C_{40}-group, or

R^2 is a C_1-C_{30}-group, or two or more radicals R^2 may be connected to one another in such a way that the radicals R^2 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

R^3 are identical or different and are each a C_2-C_{25}-alkenyl,C_3-C_{15}-alkylalkenyl, C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_1-C_{25}-alkyl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl or fluorinated C_7-C_{30}-alkylaryl,

X is a halogen atom,

Y is oxygen or sulfur,

n is from 0 to 4,

n' is from 0 to 4,

m is from 1 to 3,

k is 1,

B is a bridging structural element between the two cyclopentadienyl rings and

one or both cyclopentadienyl rings are substituted in such a way that they form an indenyl ring.

10. A compound as claimed in claim 9, wherein

M is Ti, Zr or Hf,

R^1 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are

identical or different and are each a hydrogen atom a C_1-C_{20}-alkyl, C_1-C_{10}-fluoroallkyl, C_1-C_{10}-alkoxy, C_6-C_{10}-aryl, C_6-C_{10}-fluoroaryl, C_6-C_{10}-aryloxy, C_2-C_{10}-alkenyl,

or R^1 is C_1-C_{25}-alkyl, C_2-C_{25}-alkenyl, C_3-C_{15}-alkylalkenyl, C_6-C_{24}-aryl, C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_1-C_{25}-alkyl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl, fluorinated C_7-C_{30}-alkylaryl, or C_1-C_{12}-alkoxy, or two or more radicals R^1 may be connected to one another in such a way that the radicals R^1 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

R^2 are identical or different and are each a radical $Si(R^{12})_3$, where R^{12} are identical or different and are each a hydrogen atom a C_1-C_{20}-alkyl, C_1-C_{10}-fluoroallkyl, C_1-C_{10}-alkoxy, C_6-C_{10}-aryl, C_6-C_{10}-fluoroaryl, C_6-C_{10}-aryoxy,C_2-C_{10}-alkenyl,

or R^2 is C_1-C_{25}-alkyl, C_2-C_{25}-alkenyl, C_3-C_{15}-alkylalkenyl, C_6-C_{24}-aryl, C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_1-C_{25}-alkyl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl, fluorinated C_7-C_{30}-alkylaryl, or C_1-C_{12}-alkoxy, or two or more radicals R^2 may be connected to one another in such a way that the radicals R^2 and the atoms of the cyclopentadienyl ring which connect them form a C_4-C_{24}-ring system which may in turn be substituted,

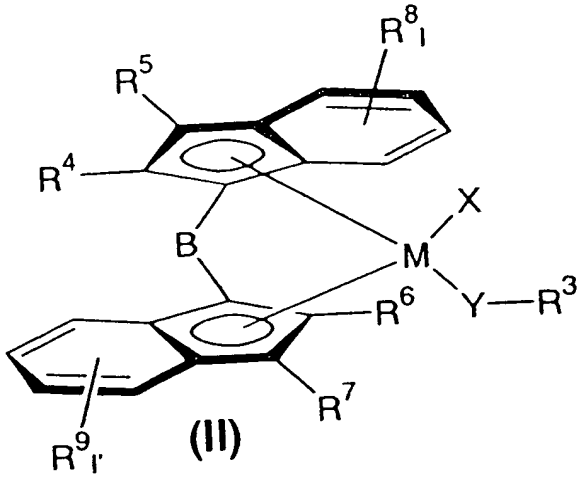
X is chlorine

Y is oxygen or sulfur,

m is 1 and

one or both cyclopentadienyl rings are substituted in such a way that they form an indenyl ring which is substituted.

11. A compound of the formula (II)



(II)

where

M is Ti, Zr or Hf,

R^3 is isopropyl, tert-butyl, cyclohexyl or octyl, a C_5-C_{24}-heteroaryl, C_7-C_{30}-arylalkyl, C_7-C_{30}-alkylaryl, fluorinated C_6-C_{24}-aryl, fluorinated C_7-C_{30}-arylalkyl, or fluorinated C_7-C_{30}-alkylaryl

R^4, R^6 are identical or different and are each a hydrogen atom or a C_1-C_{20}-group,

R^5, R^7 are identical or different and are each a hydrogen atom or a C_1-C_{20}-group,

R^8, R^9 are identical or different and are each a hydrogen atom, a halogen atom or a C_1-C_{20}-group, and two radicals R^8 or R^9 may form a monocyclic or polycyclic ring system which may in turn be substituted,

X is a halogen atom,

Y oxygen or sulfur,

l, l' are identical or different and are each an integer from zero to 4,

B is a bridging structural element between the two indenyl radicals.

12. A compound as claimed in claim 11, wherein, in the formula (II),

M is zirconium,

R^4, R^6 are identical or different and are each a hydrogen atom, a C_1-C_{18}-alkyl, C_2-C_{10}-alkenyl, C_3-C_{15}-alkylalkenyl, C_6-C_{18}-aryl, C_5-C_{18}-heteroaryl, C_7-C_{20}-arylalkyl, C_7-C_{20}-alkylaryl, fluorinated C_1-C_{12}-alkyl, fluorinated C_6-C_{18}-aryl, fluorinated C_7-C_{20}-arylalkyl or fluorinated C_7-C_{20}-alkylaryl,

R^8, R^9 are identical or different and are each a hydrogen atom, a halogen atom a linear or branched C_1-C_{18}-alkyl group, C_2-C_{25}-alkenyl, C_3-C_{15}-alkylalkenyl, a C_6-C_{18}-aryl group which may be substituted, C_5-C_{18}-heteroaryl, C_7-C_{20}-arylalkyl, C_7-C_{20}-alkylaryl, fluorinated C_1-C_{12}-alkyl, fluorinated C_6-C_{18}-aryl, fluorinated C_7-C_{20}-arylalkyl or fluorinated C_7-C_{20}-alkylaryl, and two radicals R^8 or R^9 may form a monocyclic or polycyclic ring system which in turn may be substituted,

X is chlorine,

Y is oxygen, sulfur or NR^3,

l, l' are identical or different and are each 1 or 2,

13. A catalyst comprising at least one compound as claimed in claim 9 and a support and, optionally, a cocatalyst.

14. A process for preparing a polyolefin which comprises polymerizing an olefinic monomer in the presence of a catalyst as claimed in claim 13.